

A Case Study on the Fly Ash Brick Manufacturing Plant for Uplifting the Deprived Human Resource of the Society by TATA Power: A Step Toward Sustainable Business



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With 'Leadership with Care' being TATA Power's guiding principle or more than nine decades, the company has endeavored to positively uplift the lives of communities around its areas of operation. In line with the Tata Group belief that addressing the social needs of traditionally disadvantaged groups is the 'right thing to do' and as part of nation building endeavor, Tata Power has carved out a focused approach for the upliftment of these communities through Affirmative Action. The paper focuses on the initiatives taken by TATA for the upliftment of the less privileged class. Data has been collected from primary and secondary sources.

1. Introduction

Over 50% of India's electricity generation is coal-based. Coal supplies to the power sector contain 44% ash on an average. In the year 2011-12, an estimated 108 million tons of fly ash was generated. It is further estimated that only 54.53% of fly ash found gainful utilization (central electricity authority report 2011-12). The increased quantum of ash generated and likely to be generated in future, have given rise to growing concerns for maximizing its gainful utilization. The concerns related to low levels of ash utilization are also linked to the environmental and other costs associated with ash disposal. In the wake of above facts, Tata Power, India's largest integrated private power utility, has undertaken various initiatives and conducted workshops to educate and spread awareness about the utilization of fly ash from thermal coal-based plants for construction. Tata Power is utilizing the waste generated for our own use in an environment friendly manner and are also sensitizing people on optimum utilization of waste material.

Tata Power has thermal power station situated in Jojobera in Jharkhand district. The company follows affirmative action practices to uplift the deprived communities present in the surroundings of its power plants. Tata Power's Jojobera thermal power station has started manufacturing fly ash bricks. The technology adopted for making fly ash bricks is eco-friendly. It does not require steaming or auto-craving as the bricks are cured by water only. Since a firing process is avoided, there is no emission and no effluent is discharged. The bricks manufactured are being used inside the plant for making walls and for civil repairing jobs as well as in community for construction of rooms and boundary walls. The fly ash brick plant is in line with the company's sustainability policy and is a step towards social commitment. With this initiative Tata Power aims to create employment opportunity for the tribal youth present around the Jojobera plant Location.

2. Background

To provide an entrepreneurial opportunity to the local tribal youth at Jojobera, Tata Power decided to start a fly ash bricks making unit in Jojobera. Following pie chart shows ST population within different states of India.

ST Population of Indian States- Census 2011

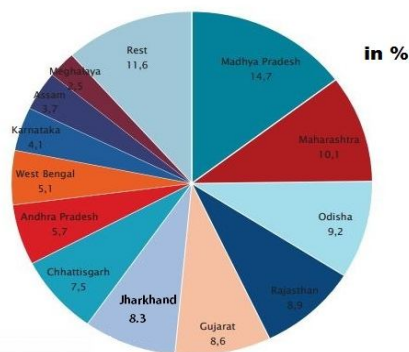


Chart for ST population of Indian States 2011

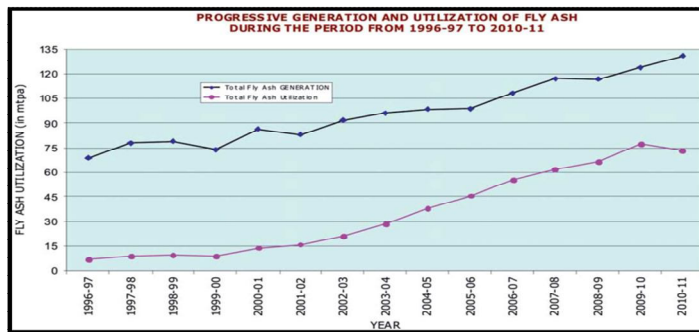
As the Chart above clearly shows that the % population of ST in state of Jharkhand is 8.3 out of total ST population in India. The ST Population is 26.2% in Jharkhand. According to census 2011, East Singhbhum district in Jharkhand, where Jojobera is located; stands second for tribal population in Jharkhand state (SC/ST Population is 34%). The literacy rate for Jamshedpur is 78.5% where most of the tribal population lack higher education and therefore are deprived from employment opportunities which require skilled labor. Considering this fact, Tata Power thought of venturing an entrepreneurial program which will include this tribal youth and provide them chance to improve their lifestyle.

The conventional practice of firing clay bricks in traditional kilns consumes large quantities of coal, firewood, and other biomass fuels. The Indian brick industry, which is the second largest producer in the world, next to China, consumes more than 24 million tons of coal annually. Conventional clay bricks lead to erosion of the top soil which is harmful to the environment and hence of concern to the government and agricultural scientists as it affects fertility of land available for cultivation and growing crops. Eco-Bricks means technically superior fly ash-based bricks which are better in terms of strength, water absorption, efflorescence and other parameters compared to normal bricks.

3. Market Scenario for Flyash Bricks

The country consumes about 180 billion tonnes bricks, exhausting approximately 340 billion tonnes of clay every year and about 5000 acres of top soil land is made unfertile for a long period. The Government is seriously concerned over soil erosion for production of massive quantities of bricks, in the background of enormous housing needs.

The excellent engineering property and durability of fly ash brick enlarges its scope for application in building construction and development of infrastructure, construction of pavements, dams, tanks, under water works, canal lining and irrigation work etc. An enormous quantity of fly ash is available in and around thermal power stations in all the states. The demand of bricks could be met by establishing small units near thermal power stations and to meet the local demand with less transportation costs.



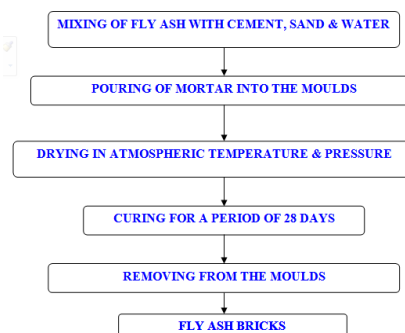
The graph shows the trends of utilization of fly ash during the period 1996-97 to 2012-11.

It is evident that the utilization of fly ash is gradually increasing over the period. This highlights the fact that there is wide opportunity for fly ash products in the market.

3.1 Reasons to choose Flyash Brick Manufacturing Plant

- Enhancing income for tribal youth promoting entrepreneurship
- Easy availability of fly ash
- Eco friendly manufacturing process
- Gainful use of fly ash creating low cost product for the benefit of the local community
- to meet the higher demand of bricks in local area

3.2 Process of Manufacturing Fly ash Bricks



The picture above shows the flow chart of Flyash brick manufacturing process.

Fly Ash bricks are made of fly ash, cement and sand.

Fly ash, sand and cement are manually fed into a pan mixer where water is added in the required proportion for intimate mixing.

The proportion of the raw material is generally in the ratio 50-60% of flyash, 8-10% ordinary Portland cement and 30-40% sand, depending upon the quality of raw materials. The mixture is slow setting pozzalona cement mix. Raw materials required in the proportion are thoroughly mixed in pan mixer and made in semi dry mix by adding sufficient amount of water.

The mix ratio of Fal-G is Fly Ash: Lime: Gypsum:: 60:30:10

Therefore, 1 tonne of Fly Ash will produce $1/0.6=1.67$ tonnes of fal-G

After mixing, the mixture is shifted to the hydraulic/mechanical presses. The specially designed machine to give high pressure load at the slow rate in mould designed for customer requirements in the order of 280 to 350 kg/ inch. Holding the pressure at specific time gives the more strength of the finished product.

The molded the bricks then transfer to store in covered space for three days (minimum) for setting. Then the bricks are taken to yard for water curing for 28 days. Then it sorted and tested before dispatch.

Basically Fly ash brick manufacturing technology consists of regular mechanical type and hydraulic version. Tata Power collaborated with the vendor Hanje Hydrotech based in Sangli Maharashtra.

The hydraulic version is latest and gives higher production output with minimal inputs like labor and power. The strength of bricks in hydraulic version is better than the others. It gives the pressure of 25 to 50 Ton in lieu of 15 ton in mechanical versions. Embossing the monogram of company on the bricks is easy. Production is high. Continuous operation is possible. The Cost of each machine is Rs.3.72 lakhs.

Component	% contribution
Flyash	50-60
Cement	8-10
Sand or Quarry dust	30-40

The table shows that the ideal fly ash brick contains.

3.3 Procurement

The basic raw material required is fly ash, which is procure from the thermal power station at Jojobera. Cement is procured from vendors in nearby area of unit.

Sand dust can be easily available through the local contractors. At Jojobera, however Tata Power has established sand crusher to satisfy this need. Stone dusts are used at Jojobera. At times, use of Pond ash is made for ash-bricks generation. Fly ash is used when pond ash is not available. So we can call these as **Ash-bricks**, not always fly ash bricks.

3.4 Human Resources

As mentioned earlier Tata Power has undertaken this initiative to support the local tribal youth at Jojobera. The flyash brick manufacturing plant requires unskilled labor in majority. There are no specific education criteria for general labors. They are selected from the local tribal community. Following table shows the requirement of human recourses.	No.
Production Manager	1
Un skilled workers	22
Office assistant	1
Watch man	1

In current situations, the production is managed by Tata Power, hence the production manager would a trained and skilled resource provided by Tata Power.

The workers are given training to handle the machinery and about the whole process of flyash brick manufacturing.

The training given to workers include

- The combination of contents to add in pan mixture. Exact quantities of each flyash, lime, gypsum, sand dust etc.
- To handle the various machinery with its different power requirements.
- To handle the bricks onto the pallet.
- To maintain the synchronization among the speed of all machines.
- Safety measures while handling the machine.

4. Benefits

- Number of beneficiaries of the project will be the members of all 8 SHG formed with 11 members each. Currently total beneficiaries are **20 people** from tribal community
- The project also lead changes in the lives of the tribal people involved as the project provided income of **Rs. 6000 per AA household**.
- Total approx. monthly earnings of one unit is **Rs 500000**
- Flyvash bricks are environment friendly as
 - It uses fly ash which is by-product of thermal power stations.
 - Saves agricultural land which is used for clay bricks.
 - Less energy intensive as compared to clay bricks and helps keeping clean environment.
 - Can be manufactured at construction site also.
 - The project provided entrepreneurial opportunity for tribal youth at Jojobera.
 - It served the motive of Affirmative Actions as it helped in upliftment of deprived community.
 - Fly ash will be supplied free of cost from the plant silos to any brick-maker wishing to commence Fal-G brick making.
 - Tata Power gained knowledge and experience to start up a fly ash brick manufacturing unit.
 - The project was also successful in training the people and utilizing the resources. This training to people about the fly ash brick manufacturing can be used further to start their own units.

5. Sustainability

Management (both governance and finance) by Community: Tata Power will provide the capex and opex for one year and this cost will be realized from sale of bricks over three year period. The project will be managed by SHG members with TATA POWER CR department involved in for handholding. A management committee will be formed which will control its finance & other aspects and capacity of SHG members will be build. After three to four years, once the repayment is over, the entire affairs will be maintained by the beneficiaries group themselves.

Self Help Group formed with 11 members which has been formed for saving & thrift and to engage in entrepreneurial activity to enhance the income level of group members and it is engaged in various social activities.

Annexure 1 Standard Operating Procedure (SOP) – Step Wise Activities to set up Fly ash Brick Manufacturing Plant

Steps	Activity	Details	Timeframe	Responsibility
1.	Identification of activity	A. Check feasibility of the Fly ash brick manufacturing in Jojobera in terms of demand for the product within the village, within the block, within the district and countrywide demand B. Check distance of the manufacturing location from block headquarters (10 km-15 km), distance from district headquarters (20km- 25 km)	1 Month	A. Local AA team
2.	Identify Land and Location for the Unit	A. As the machine is portable very less area is required for machine. 4000 sq feet area required for project. B. Telecommunication Connectivity like mobile network, telephone landline and internet availability. C. Check Access to transportation like proper roads for transport D. Company can buy or rent a small goods carrier for transporting raw material and finished goods.	1 Month	A. Local AA Team
3.	Identification of Human resources	A. Approach local villagers who are at age 18 years and above. B. Preference will be given to ST people.	1 Month	A. Local AA Team
4.	Identify Machinery required	A. Decide among the various types of machines available. The complete set of machine includes a 1. Automatic Fly ash Brick making machine hydraulic operated with all accessories and fitting with 18HP Motor (Price: Rs 12,00,000) 2. Pan Mixture 500 KG Capacity with 7.5 HP Motor (Price: Rs 2,00,000) 3. Belt Conveyor with necessary fittings and 2 HP Motor (Price: Rs 50,000)	1 Month	A. Local AA team B. Purchase department
5.	Budgets and approvals	A. Prepare memo including plan and budget B. Seek approval from various management levels	1 Month	A. Group Head – Community Relation B. Project Head C. Head – Community Relation D. Chief Sustainability Officer

6.	Market linkage	A. Identify possible collaborators for 1. Procurement of raw material 2. Operations (training and production) 3. Marketing of final product. Where in company will select collaborator among the wholesalers, retailers or association with a brand.	1 Month	A. Marketing and collaborations committee B. AA committee
7.	Training Activities	A. Identify and collaborate with professional trainers from the industry B. Ensure maximum enrollment of people. C. Provide basic requirement like electricity and other connectivity. D. Training of manufacturing fly ash bricks and safety measures while handling the machinery would be given.	7-10 days	A. AA Committee B. Collaboration with ,machine vendor for training
8.	Procure raw material	A. Procure raw material from identified partner. B. Raw material requirement depends upon the composition of bricks. C. Raw material would be procured every month. Stock of raw material required for one month will be maintained.	15-20 days	A. Project head B. Procurement department
9.	Start Production and packaging	A. Start production activity on the machine	Daily	A. Operations department B. Supervisors
10.	Sell the final product	A. Sell the final product to identified brand or wholesaler or retailer, so as to get quick access to wide market B. Sell product in local markets on own		A. Marketing department
11.	Generate Income	A. Pay wages to workers B. Some % of income to repay the cost of machine C. Some % of Income for Village development D. Some % of Income for funds for society		A. Finance department
12.	Sustainability Actions	A. Establish and support Self help groups and handover operations to them. B. Identify skilled persons among the youth and gradually handover the responsibilities of project.		A. Sustainability officers

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